

PATENT  
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**UNITED STATES PATENT APPLICATION**

**OF**

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**FOR**

**GEARED SERPENTINE BELT TOOL**

**FIELD OF THE INVENTION**  
**GEARED SERPENTINE BELT TOOL**

**PRIORITY CLAIM**

**[001]** The present application claims priority to U.S. Provisional Patent Application No. 60/456,718, filed March 20, 2003, the entire disclosure of which is hereby being incorporated by reference in its entirety.

**FIELD OF THE INVENTION**

**[002]** The present invention relates to a tool for use in vehicle repairs. In particular, the present invention relates to a tool for removing serpentine belts in vehicle engines.

**BACKGROUND OF THE INVENTION**

**[003]** Serpentine belts are present on most U.S. and import vehicles in the United States. The serpentine belt is the one found in the engine area that connects major vehicle functions, such as water pumps, alternators, air conditioning etc. The belt is spring-loaded and requires a special tool to release the spring tension to remove and replace the belt. Depending on the vehicle, the tension device is moved by placing the tool on either a bolt in the tension arm or a female square drive that is molded into the tension arm. Access to the bolt is limited, and therefore a specialty tool is required.

**[004]** Approaches to releasing the tension vary, but in all cases there are members that attach to the tool, and the tool is used to fit onto a serpentine belt idler pulley work piece.

**SUMMARY OF THE INVENTION**

**[005]** The present invention recognizes and addresses considerations of prior art constructions and methods. In one embodiment of the present invention, a serpentine belt tool for removal

and installation of a serpentine belt in a vehicle comprises a drive bar, a double box end wrench and a socket. The drive bar has a handle at a first end and a fitting at an opposite second end that is used to connect the drive bar to the double box end wrench. The double box end wrench has a first end defining a polygonally shaped opening and an opposite second end that defines a ratcheting wrench having a first plurality of teeth on an inner circumference thereof. The socket defines a second plurality of teeth on an outer circumference thereof that are adapted to be received by the ratcheting wrench first plurality of teeth. The socket also defines one of a polygonally shaped opening and a polygonally shaped tang that is received by a work piece of a vehicle idler pulley. The drive bar handle is moveable between a first direction that operates on the idler pulley work piece and a second direction that causes the drive bar handle to move relative to the idler pulley work piece.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

**[006]** A full and enabling disclosure of the present invention, including the best mode thereof, directed to one of ordinary skill in the art, is set forth in the specification, which makes reference to the appended drawings, in which:

**[007]** Fig. 1 is a top plan view of a drive bar in accordance with an embodiment of the present invention;

**[008]** Fig. 2 is a top plan view of a ratcheting wrench for use with the drive bar of Fig. 1;

**[009]** Fig. 3 is a side elevation view of the ratcheting wrench of Fig. 2;

**[0010]** Fig. 4 is a side elevation view of a socket for use with the ratchet of Fig. 2;

**[0011]** Fig. 5 is a top plan view of a square drive adapter for use with the ratchet of Fig. 2;

- [0012] Fig. 6 is a side elevation view of the square drive adapter of Fig. 5;
- [0013] Fig. 7 is a bottom plan view of the square drive adapter of Fig. 5; and
- [0014] Fig. 8 is a top plan view of a blow molded case for use with the components of Figs. 1 - 5.
- [0015] Repeat use of reference characters in the present specification and drawings is intended to represent same or analogous features or elements of the invention.

#### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

- [0016] Reference will now be made in detail to presently preferred embodiments of the invention, one or more examples of which are illustrated in the accompanying drawings. Each example is provided by way of explanation of the invention, not limitation of the invention. In fact, it will be apparent to those skilled in the art that modifications and variations can be made in the present invention without departing from the scope and spirit thereof. For instance, features illustrated or described as part of one embodiment may be used on another embodiment to yield a still further embodiment. Thus, it is intended that the present invention covers such modifications and variations as come within the scope of the appended claims and their equivalents.
- [0017] Referring to Figs. 1 - 4, a serpentine belt tool has a drive bar 10, a double box end wrench 12, and a plurality of various sockets 14 that fit differing drive belt work pieces. Referring particularly to Fig. 1, drive bar 10 has a handle 16 at one end and a fitting 18 at the opposite end. Preferably fitting 18 is a hex head member, but fitting 18 may be any suitable polygonally shaped fitting adapted to receive double box end wrench 12. The length of drive bar 10 may vary as should be well understood in this art.

**[0018]** With reference to Figs. 2 – 3, double box end wrench 12 has an opening 20 at one end of a handle 21 that cooperates with drive bar fitting 18. Preferably, wrench opening 20 is a hex shaped opening, but it should be understood that wrench opening 20 may be any polygonally shaped opening that is sized and shaped to receive drive bar fitting 18. A ratcheting means 22 is formed on the other end of handle 21.

**[0019]** Preferably, ratcheting means 22 is a ratchet wrench with a plurality of teeth 24 formed on an inner circumference thereof. Teeth 24 may be of any desired spacing, and in a preferred embodiment, plurality of teeth 24 consists of six equally-spaced teeth. Ratcheting wrenches are well known in this art. Therefore, a detailed description of the structure and operation of such wrenches is not included herein.

**[0020]** Referring to Fig. 4, each socket 14 has a plurality of teeth 26 formed on a first end 28 that cooperate with ratcheting wrench teeth 24. An opposite end 30 of socket 14 has an opening 32 formed therein. Typically, socket opening 32 is polygonally shaped and of standard sizes to fit a work piece on the idler pulley of a vehicle. Moreover, because the idler pulley work piece differs in size and shape among various vehicle manufacturers, more than one socket may be provided for use with ratcheting wrench end 22 to accommodate such variations.

**[0021]** The serpentine belt tool is used by first connecting wrench 12 to drive bar 10. More particularly, polygonally shaped wrench open end 20 receives drive bar fitting 18 to rotationally secure wrench 12 to drive bar 10. Ratcheting wrench end 22 receives socket 14 so that socket teeth 26 are received by and rotationally lock with ratcheting wrench teeth 24. The idler pulley work piece is received by polygonally shaped socket opening 32 and the drive bar

is reciprocated to counteract the spring load of the idler pulley to install or remove the serpentine belt.

**[0022]** The present invention provides greater versatility than has been available previously. That is, drive bar 10 may be attached to double box end wrench 12 at many different angles. Moreover, ratcheting wrench 22 provides a means to drive the idler pulley work piece with minimum effort and to index the tool to obtain maximum leverage within the confined space available.

**[0023]** Referring to Figs. 5 – 7, ratcheting wrench end 22 is also adapted to receive a square drive adapter 34. Square drive adapter 34 has a first end 36 defining a plurality of teeth 38 on an outer circumference thereof and a second end 40 defining a polygonally shaped tang 42. First end teeth 38 are sized and shaped to be received by ratcheting wrench end teeth 24. In a preferred embodiment, polygonally shaped tang 42 is a square tang that is sized to fit into an idler pulley work piece. Because different vehicles have differing sized work pieces, more than one size square drive adapter 34 may be provided to accommodate the varying size work pieces among manufacturers.

**[0024]** Referring to Fig. 8, a plurality of crow foot wrenches 44 may be provided to fit on the different sized idler pulley work pieces. Each crow foot wrench 44 has a square opening 46 in one end that receives tang 42 from one of square drive adapters 34. An opposite end of crow foot wrench 44 has an open end wrench 48 for receiving the idler pulley work pieces. It should be understood that multiple crow foot wrenches of varying sizes may be provided to accommodate the varying work pieces among vehicle manufactures.

**[0025]** A blow molded case 50 is formed with a plurality of recesses shaped to receive different parts of the serpentine belt tool. Each recess receives a different component of the tool such as the handle 10, double box end wrench 12, individual sockets 14, individual square drive adapters 34 and individual crow foot wrenches 44. Blow molded case 50 has a top portion 52 connected to a bottom portion 54 by a hinge 56. Two latches 58 lock top portion 52 to bottom portion 54 to secure the contents of the case. .

**[0026]** It should be appreciated by those skilled in the art that various modifications and variations can be made in the present invention without departing from the scope and spirit of the invention. It is intended that the present invention cover such modifications and variations as come within the scope and spirit of the appended claims and their equivalents.